

**GEOLOGIC AND MINERAL RESOURCE POTENTIAL OF THE CHAMBERS FERRY
ROADLESS AREA, SABINE COUNTY, TEXAS**

By

B. B. Houser, U.S. Geological Survey

and

George S. Ryan, U.S. Bureau of Mines

STUDIES RELATED TO WILDERNESS

Under the provisions of the Wilderness Act (Public Law 88-577, September 3, 1964) and the Joint Conference Report on Senate Bill 4, 88th Congress, the U.S. Geological Survey and the U.S. Bureau of Mines have been conducting mineral surveys of wilderness and primitive areas. Areas officially designated as "wilderness," "wild," or "canoe" when the act was passed were incorporated into the National Wilderness Preservation System, and some of them are presently being studied. The act provided that areas under consideration for wilderness designation should be studied for suitability for incorporation into the Wilderness System. The mineral surveys constitute one aspect of the suitability studies. The act directs that the results of such surveys are to be made available to the public and be submitted to the President and the Congress. This report discusses the results of a mineral survey of the Chambers Ferry Roadless Area, Sabine National Forest, Sabine County, Tex.

**MINERAL RESOURCE POTENTIAL
SUMMARY STATEMENT**

Geologic and geochemical investigations have been conducted to evaluate the mineral resource potential of the Chambers Ferry Roadless Area, Sabine County, Tex. The roadless area lies within the western Gulf of Mexico Coastal Plain on the southern margin of the Sabine uplift and is underlain by lower Eocene semiconsolidated clastic sediments. Thirty-four percent of the mineral rights to land within the roadless area are privately owned.

The area has moderate to high potential for oil and gas resources on the basis of the regional setting and nearby producing fields. Near-surface lignite is present in the area, but the lignite seams are thin and laterally discontinuous and the ash content is high. These conclusions are based on surface and shallow subsurface geologic examination, radiometric surveys, and geochemical and mineralogic study of subsurface auger samples.

INTRODUCTION

There has been no mining or quarrying activity within the roadless area. There are no producing oil or gas wells although one dry hole has been drilled in the area and three additional dry holes have been drilled within 1.5 mi of the area boundaries. The geologic mapping, shallow drilling, geochemical sampling, and radiometric surveys of this study were conducted in April 1981 and January to March 1982.

Area description

The Chambers Ferry Roadless Area comprises 4,661 acres in the Sabine National Forest in Sabine County, Tex., adjacent to the Texas-Louisiana State line (fig. 1).

The roadless area is in the Gulf of Mexico Coastal Plain and is characterized by low hills separated by numerous small drainages. The elevation ranges from 160 to 285 ft. Drainage consists of steep-gradient intermittent streams and gullies tributary to Martinez Bayou on the northeast, Patroon Bayou on the southwest, and the Sabine River on the east (now

Toledo Bend Reservoir). The climate is humid subtropical with an annual precipitation of about 52 in. and a mean annual temperature of about 66°F. The area supports the vegetation of the pine woods belt of the forested Coastal Plain.

Access to the periphery of the area is provided by Texas Route 87, U.S. Forest Service road 121-1, and by boat on Toledo Bend Reservoir. Interior access is provided by U.S. Forest Service roads 121-1, 121-2, 121-A, and 131-1 and by abandoned logging roads.

U.S. Forest Service records indicate that 34 percent of the mineral rights of the Chambers Ferry Roadless Area are privately held. Permits for seismic exploration surveys in and around the area are issued routinely.

Previous mineral resource investigations

The roadless area has been included in several reports of regional scope on mineral and energy resources. Sabine County is included in the survey of the rock and mineral resources of east Texas by Fisher (1965). Under the National Uranium Resource Evaluation (NURE) program, aerial gamma-ray and

magnetic surveys were made of the Alexandria 1° x 2° quadrangle, which includes the Chambers Ferry Roadless Area (U.S. Department of Energy, 1980). The ball clay and bentonite resources of the central and western Gulf Coastal Plain were assessed by Hosterman (written commun., 1982). Lignite resources in the national forests of Texas have been evaluated in a special report by Garner and others (1978); lignite resources in Texas, as a whole, have been evaluated by Kaiser and others (1980). Information on oil and gas production, reserves, and potential can be found in Cram (1971), Peppard-Souders and Associates (1981 and 1982), International Oil Scouts Association (1977), American Petroleum Institute, American Gas Association, and Canadian Petroleum Association (1980), University of Texas at Austin, Bureau of Economic Geology (1981), and The Railroad Commission of Texas (1981).

Present investigation

Geologic and geochemical investigations have been conducted to evaluate the mineral resource potential of the study area. The U.S. Bureau of Mines investigation included a radiometric survey and analysis of surface sediment samples for uranium. The U.S. Geological Survey conducted geologic and geochemical surveys of the region, which included drilling and collecting samples from six auger holes (ranging from 57 to 102 ft deep) for stratigraphic and geochemical analyses.

The oil and gas resource potential of the area was evaluated by Gordon L. Dolton of the U.S. Geological Survey, using readily available data only.

GEOLOGY

The roadless area is in the north-central part of the greater western Gulf basin, which is filled with a thick sequence of off-lapping sedimentary prisms of Cenozoic clastic rocks. This sequence rests upon Cretaceous and Jurassic sandstones and carbonates and the Jurassic Louann Salt. The area was mapped previously at a scale of 1:250,000 as part of the Palestine 1° x 2° quadrangle of the Geologic Atlas of Texas (Barnes, 1968).

The rock units present in the Chambers Ferry area are semiconsolidated to consolidated, fine-grained clastic sediments of the lower Eocene Wilcox Group and Quaternary alluvium. In this region the Wilcox Group is predominantly a mudstone facies informally named the Pendleton Lagoon-Bay system (fig. 2). Fisher and McGowen (1967, p. 117) described the Pendleton system as consisting "chiefly of laminated to locally bioturbated muds with local lenses and beds of very fine to fine-grained, sparingly glauconitic, massive to crossbedded sands and fine-grained, broken, massive to crossbedded, lignitic sands * * * clay-ironstone concretions are common. Lignites are locally common, though they are relatively impure, thin, and discontinuous." This description corresponds well to the lithologies encountered in the auger holes and in natural exposures of the Wilcox Group in bluffs bordering Toledo Bend Reservoir.

Rocks of the middle Eocene Claiborne Group crop out on a relatively high ridge less than 1.5 mi southwest of the study area. The approximate contact

of the Claiborne with the Wilcox Group was taken from the geologic map of the Palestine 1° x 2° quadrangle (Barnes, 1968).

Pleistocene(?) and Holocene alluvium is present in the flood plain of Patroon Bayou. The alluvium is thin and was not investigated in this study.

STRUCTURE

The Chambers Ferry area is on the south-southwest margin of the Sabine uplift (fig. 2) and, thus, the rocks dip gently to the southwest. Because of the absence of distinctive stratigraphic marker horizons, more precise determination of the strike and dip of the units is not possible. Exposures in the bluffs along Toledo Bend Reservoir indicate that the rocks probably are largely undeformed.

ASSESSMENT OF MINERAL RESOURCE POTENTIAL

Oil and gas

The Chambers Ferry Roadless Area has moderate to high oil and gas resource potential (fig. 3). Exploration drilling has been done in the vicinity. Most exploratory wells were shallow, on the order of 1,500-3,000 ft, and penetrated portions of the Eocene sequence; however, there are several deep wells in the general area, which test rocks as old as Cretaceous. A 9,500-ft test well was drilled near the southeastern edge of the area (Santa Fe Energy, #1 Chamber). The nearest production is about 2-3 mi to the north and northwest of the roadless area at Bridges and Patroon fields in Shelby County, Tex. These fields, discovered in 1950 and 1948 respectively, have produced only small amounts of high-gravity oil to date (slightly more than 50,000 barrels) from the Lower Cretaceous Fredericksburg Group. Gas production has been established at Huxley field about 15 mi north of the roadless area, where production is from the Lower Cretaceous Paluxy, Rodessa, and Pettet Formations. Oil has been produced about 10 mi east of the Chambers Ferry Roadless Area in Sabine Parish, La., at Zwolle, Pendleton-Many, and Converse fields, in addition to production at small fields such as Blue Lake (now beneath Toledo Bend Reservoir). The significant production zones at these fields in Louisiana are Upper and Lower Cretaceous reservoirs, and producing depths are generally 1,500-3,000 ft. By the end of 1976, Pendleton-Many, the largest field, had produced about 20 million barrels of oil and Zwolle had produced more than 16 million barrels.

Near-surface lignite

The resource potential for near-surface lignite in the Chambers Ferry area is high, but the seams are thin and laterally discontinuous and the ash content is high. Seven lignite seams, ranging from 2 to 11 ft thick and averaging 4 ft in thickness, were penetrated in the auger holes. In table 1, proximate and ultimate analyses of four lignite samples from the area are compared with an average analysis of lignites from the Wilcox Group on the Sabine uplift, chiefly to the northwest of the roadless area (Kaiser and others, 1980). The analyses shown in table 1 indicate that the lignite in the roadless area has a high ash content and

Table 2.--Average trace element determinations for 18 samples of silty clay
from the Wilcox Group and 202 samples of the Pierre Shale

[Six-step D.C.-arc semiquantitative spectrographic analyses made in U.S.
Geological Survey laboratories. Analyst, Betty Adrian. Determinations for
Pierre Shale from Schultz and others (1980)]

Trace elements	Wilcox Group		Pierre Shale	
	Arithmetic mean (ppm)	Standard deviation (ppm)	Arithmetic mean (ppm)	Standard deviation (ppm)
Mn	508	232	720	275
B	150	17	99	49
Ba	683	110	650	300
Co	22	6	12	6
Cr	133	30	75	34
Cu	31	13	34	23
La	51	5	39	25
Ni	49	22	36	27
Pb	47	10	22	8
Sc	15	2	16	5
Sr	197	48	204	204
V	128	31	156	97
Y	34	9	28	12
Zr	178	55	190	62

Schultz, L. G., Tourtelot, H. A., Gill, J. R., and Boerngen, J. G., 1980, Composition and properties of the Pierre Shale and equivalent rocks, northern Great Plains region: U.S. Geological Survey Professional Paper 1064-B, 114 p.

The Railroad Commission of Texas, 1981, Annual Report of the Oil and Gas Division: Austin, The Railroad Commission of Texas, 700 p.

U.S. Department of Energy, 1980, Hydrogeochemical and stream-sediment basic data for Alexandria NTMS quadrangle, Texas: National Uranium Resource Evaluation Project, GJBX-152(80), 133 p.

University of Texas at Austin, Bureau of Economic Geology, 1981, Energy resources of Texas: University of Texas at Austin, scale 1:1,000,000.

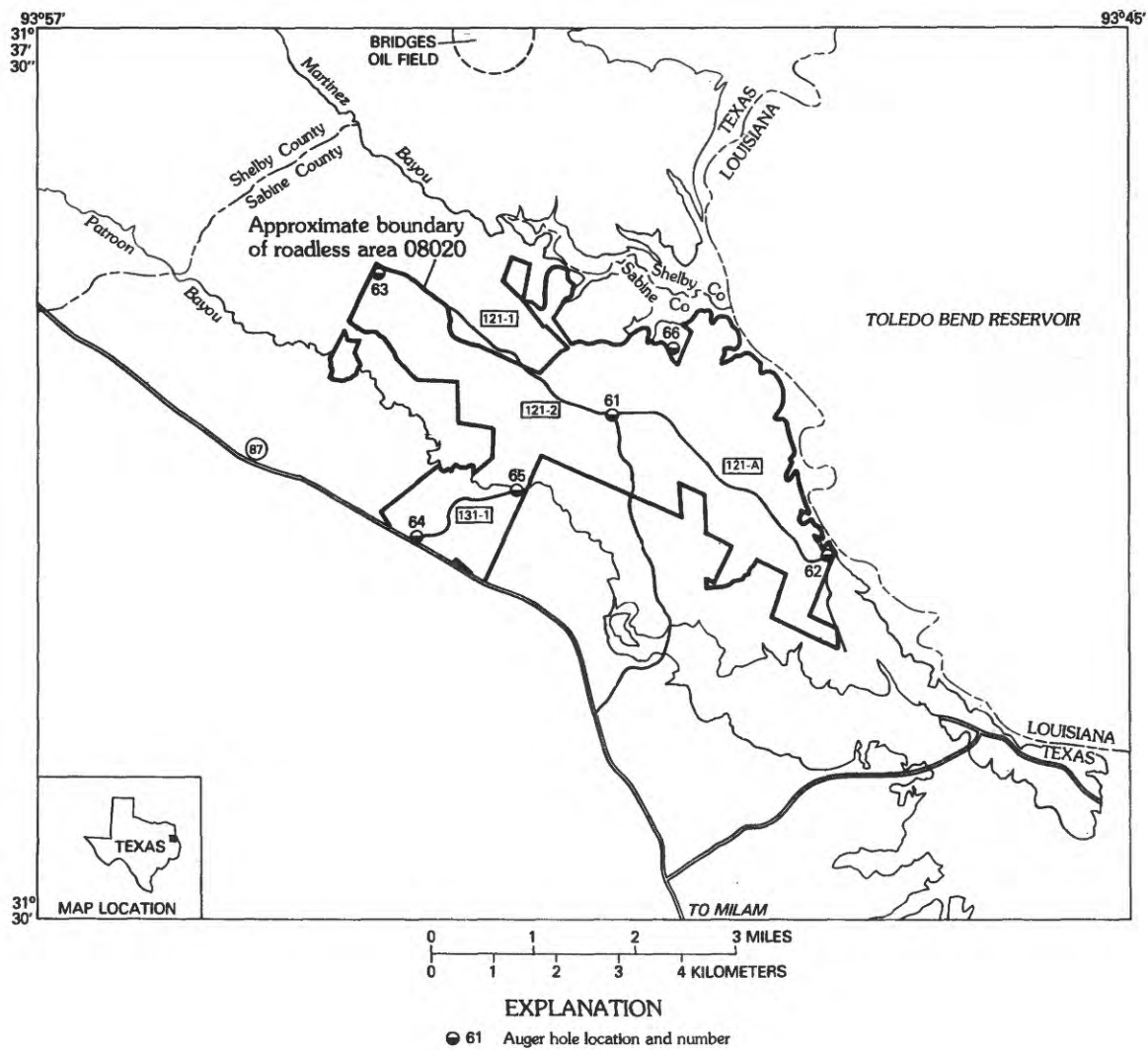


Figure 1.—Index map showing location of the Chambers Ferry Roadless Area (U.S. Forest Service area 08020), Sabine County, Texas.

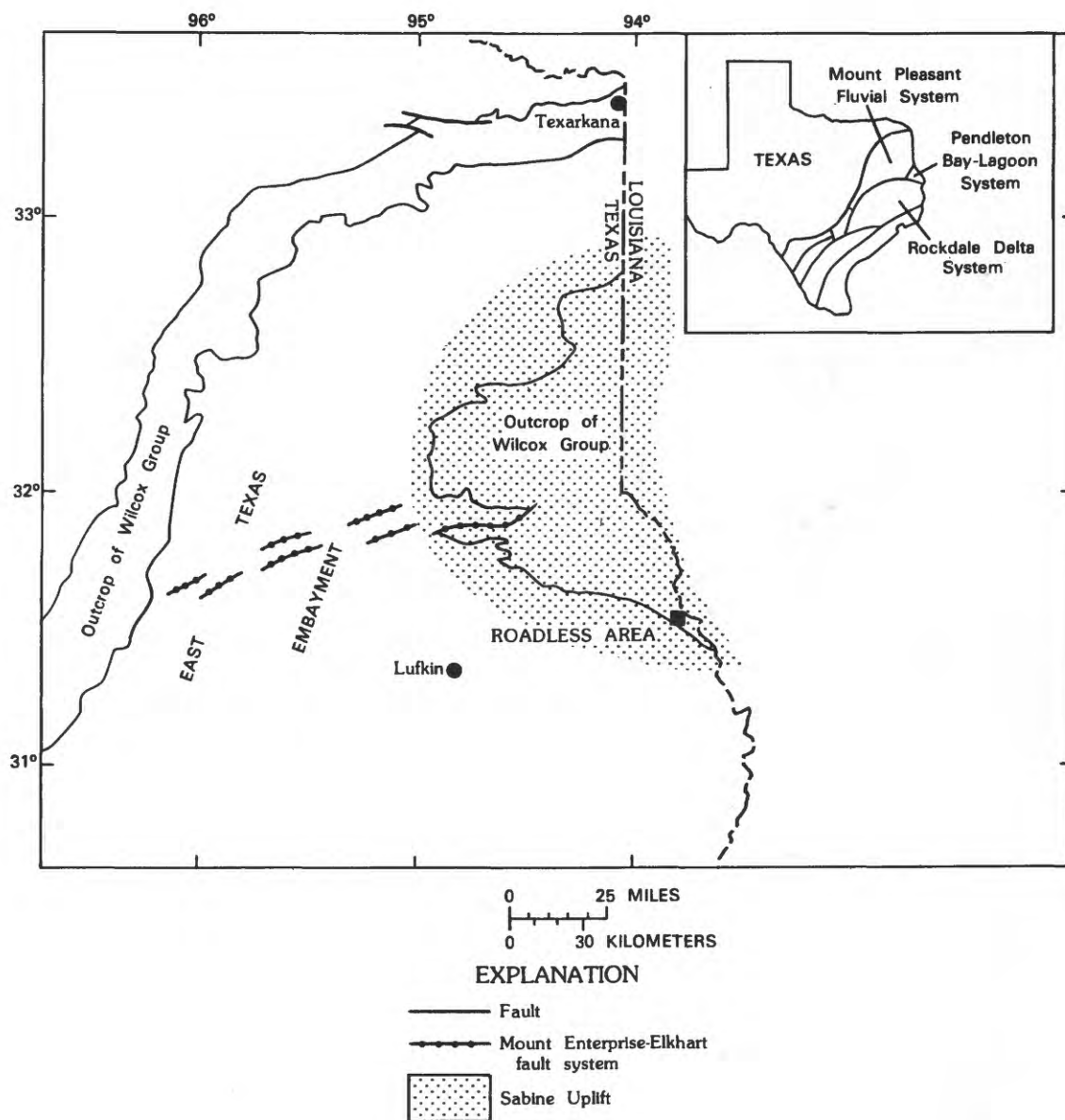
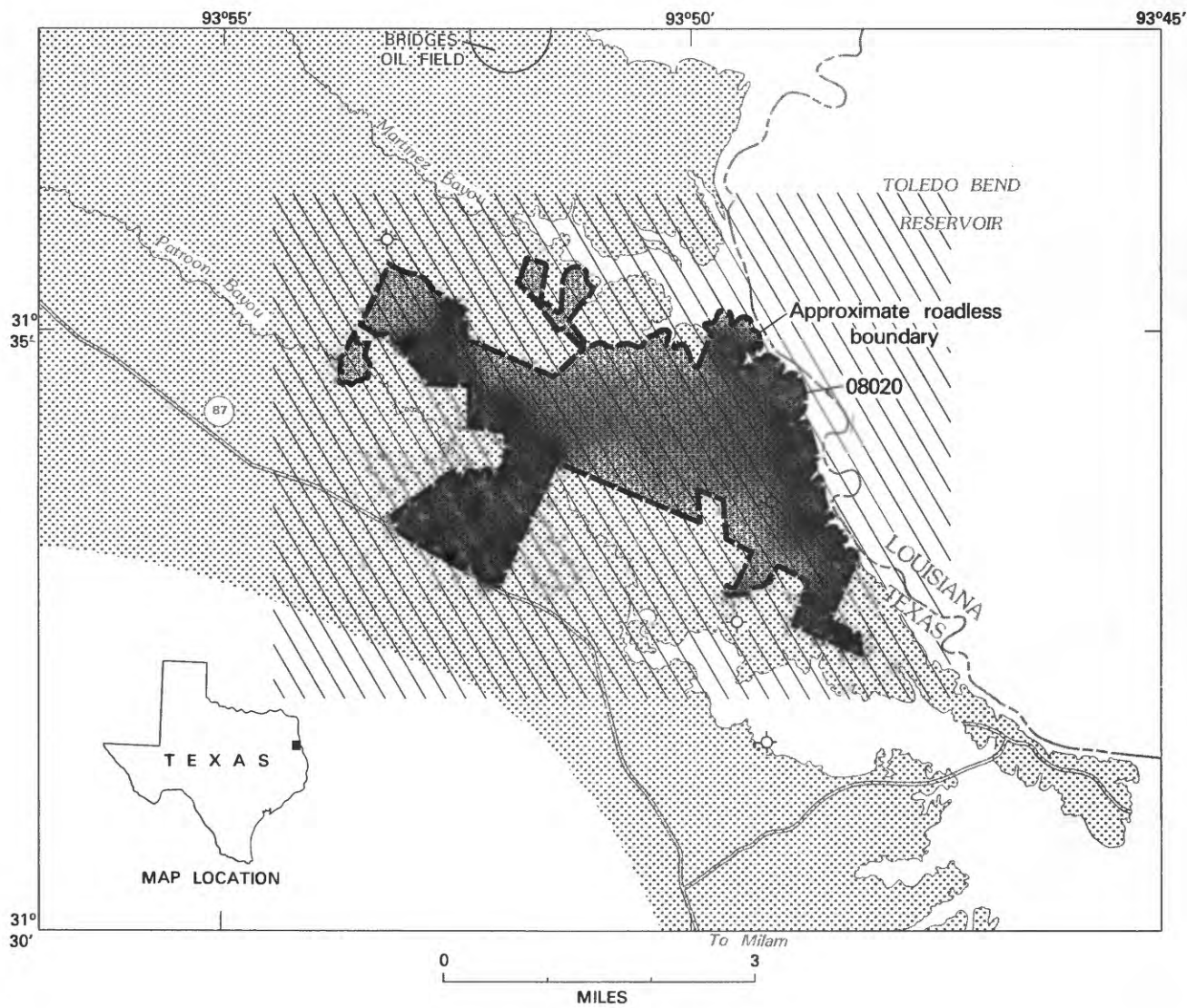


Figure 2.—Major structural elements of the Gulf Coastal Plain in East Texas, and depositional systems of the Wilcox Group in and adjacent to the Chambers Ferry Roadless Area (modified from Fisher and McGowen, 1967). Extension of the Sabine uplift into Louisiana not shown.



EXPLANATION



Geologic terrane with moderate to high potential for oil and gas and high potential for lignite



Wilcox Group, undivided (Eocene)



Oil and gas test well (dry hole)

Figure 3.—Map showing mineral resource potential of the Chambers Ferry Roadless Area, Texas.

